



## **General Certificate of Education**

### **Applied Science**

**8771/8773/8776/8777/8779**

**SC08**

**Medical Physics**

## **Report on the Examination**

*2010 examination - January series*

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## General Comments

Most candidates were well prepared for this examination but it was apparent that some had had little opportunity for carrying out relevant practical work whereas others had clearly had practical experience of investigating radioactivity and the refraction of light.

Some candidates also appeared to have learned key phrases which they produced as responses to questions whether or not they were applicable to the context. It cannot be stressed enough that candidates need to read the questions carefully, think about the information provided and what they are asked to do before starting to write their answer, bearing in mind that most of the marks on this paper are for applying knowledge rather than basic recall.

## Question 1

- (a)(i) Most candidates were able to state the function of the vacuum, cathode and lead housing but many thought the purpose of the anode was to cool down the X-ray tube by acting as a fan – clearly impossible when in a vacuum. There was also some confusion between electrons and X-rays.
- (ii) As above, there was a misunderstanding by some candidates as to why the anode was rotated. Most candidates knew that this was to stop overheating but some thought this was because it acted as a fan and ‘to cool it down’, which was not accepted. Many candidates did not pick up on the requirement to use their knowledge of energy transfer to gain full marks resulting in most candidates gaining only one of the two marks available.
- (b)(i) Most candidates gained this mark.
- (ii) Most candidates gained this mark though some thought that lead shielding reflected X-rays, some talked about lead absorbing gamma rays and some thought wearing a film badge protected the radiographer because the film badge attracted and absorbed all the X-rays so that none reached the radiographer.
- (c)(i) Generally correct.
- (ii) Most candidates gained both marks.
- (d)(i) Most candidates gained this mark.
- (ii) Most candidates gained two marks. They were able to substitute and re-arrange the equation correctly but did not state the correct unit.

## Question 2

- (a) Most candidates gained at least one mark.
- (b)(i) Few candidates were able to answer this correctly.
- (ii) Few candidates were able to answer this correctly.
- (iii) Despite this question having appeared several times in previous papers, this was answered very poorly. Most candidates gained only one or two of the four available marks.

- (c)(i) Most candidates answered this correctly.
- (ii) Few candidates gained both marks though many gained one compensation mark for either correct substitution or correct use of sines.
- (d)(i) Most candidates gained at least one mark with many gaining both.
- (ii) Most candidates gained one mark but provided answers that were too vague to gain both marks.

### Question 3

- (a)(i) Almost all candidates answered this correctly.
- (ii) Almost all candidates gained both marks.
- (b) Though it was stated clearly that quality of written communication would be assessed in this question, many candidates failed to follow the basic rules of punctuation, e.g. using full stops and starting sentences with capital letters and there were also basic spelling errors.

Most candidates were aware of how to use the manual sphygmomanometer though the descriptions often lacked detail (e.g. how you know when the systolic reading occurred). Some candidates thought the sphygmomanometer was used to measure pulse rate rather than blood pressure.

- (c)(i) Most candidates gained this mark.
- (ii) Most candidates gained this mark.
- (d) Most candidates gained two or three marks. It was surprising to see that a number of candidates assumed that measuring blood pressure invasively would mean it could be continuously monitored but that all non-invasive methods would automatically mean that this could not be done. This is not the case.

### Question 4

- (a) Again, quality of written communication was an issue for several candidates. Many candidates were not able to name a radiation detector and few could spell Geiger Muller tube or Geiger counter correctly.

Most candidates had a clear idea of how to tell whether the wooden box was effective but many went off the point of the question (e.g. writing about comparing different types of boxes, testing penetration power through paper, aluminium etc) and then failed to include important aspects such as testing different types of emitted radiation and explaining how they would judge how effective the box was.

- (b) Most candidates recognised that background radiation was an issue and some considered half-life but did not take this far enough to gain more than two marks.
- (c) Most candidates gained at least one mark.

- (d) This section of the question was answered well by candidates who had experienced working with radioisotopes themselves but very poorly by other candidates who seemed to have had no experience and suggested completely unrealistic precautions such as using lead lined rooms.

### **Question 5**

- (a)(i) Most candidates gained both marks.
- (ii) Most candidates gained both marks.
- (b)(i) Very few candidates gained this mark. There were some other candidates who understood what half-life meant but did not relate this to the radioisotope being in the body.
- (ii) Most candidates gained at least one of the two available marks.

### **Question 6**

- (a) Most candidates gained both marks.
- (b)(i) Very few candidates gained more than one mark because they failed to consider the context given in the question properly and discussed the use of technetium as an implant, or in some cases as a tracer, rather than as an external radiation source.
- (ii) Candidates tended to gain either two or no marks in this question.
- (c)(i) Again, candidates failed to gain marks through not thinking about the context of the question. An example of this is the type of response which said that an advantage of the microwave therapy compared with external radiotherapy was that only a small incision was required for the microwave probe. Most candidates gained two or three of the four marks available.
- (ii) Most candidates gained one or two marks here. There were the same context issues as noted for (c)(i) above.

## **Mark Ranges and Award of Grades**

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